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Abstract

SODIUM COOLED FAST REACTORS

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On the base of investigation and operational experience of experimental fast reactor BR-5, now in the Soviet Union the prototype of full scale nuclear power station with fast reactor 350 Mwe is being worked out.

This paper describes the reactor with core Φ I500mm and H=I000mm, and power I000Mwt. Fuel elements are the stainless steel tubes Φ 6,Imm, S=0,4mm, filled with dioxide uranium and plutonium wuth average density 8g/cm^3. Flattening of the power distribution in the reactor was carried out by means of various enrichment of the fuel I3% (in the internal region) and I9% (in the external region).

The fuel elements are ribbed for spacing and inserted into subassemblies.
The radial blanket 600mm thick consists of cylindrical elements filled with depleted uranium oxide is inserted into subassemblies of the same type.

The reactor is controlled by elements with B_4C, reactivity change due to burnup is compensated by movable subassemblies with fuel elements.
Reactivity changes due to heat up and power rise up to rated value are compensated by subassemblies with B_4C elements. Similar B_4C subassemblies are used for the scram of the reactor.

In the report there are main physical data and discription of the principle systems and equipment (shielding, fuel charge and discharge mechanism, pumps, heat exchangers, steam genera-

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tors) and coolants parameters of the primary, secondary and third loops (systems).

This reactor is the first full scale power reactor of the type plant for commissioning by 1970. Operational experience of the reactor and main equipment will permit to start construction more power full and modern reactor, capable of long continuous operation as a source of electrical power. Preliminary studies of such reactor 1000Mwe showed, that the further increasing D/H is desirable.

The reactor with monocarbide as a fuel has volume 3000e. It's internal breading ratio is equal to unity and enables necessary long operatuin.

Main dates of the reactor are given in the report.
As a fuel of nuclear reactors sintered mixture of dioxide uranium and plutonium is considered on the first place. In the first reactors dioxide of enriched uranium will be used.
The possibility of the application uranium and plutonium carbide as a reactor fuel, as well as metalic fuel is studied.